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THE SUITABILITY OF VARIOUS SPECIES OF AMERICAN WOODS FOR PULP AND PAPER PRODUCTION

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AMERICAN PULPWOODS

The Suitability of Various Species of American Woods for Pulp and Paper Production*

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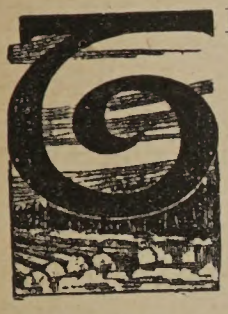

THE Forest Products Laboratory, Madison, Wis., has in the past received frequent requests as to the suitability of various woods for pulp and paper production and it has therefore, seemed advisable to prepare for publication some of the available data on this subject. The laboratory has carried on an extended investigation over a period of more than ten years and has collected experimental pulping data on practically all the possible species of American pulp woods. These data, in so far as the chemical pulps are concerned, have mainly been obtained from experimental cooks made at the Forest Products Laboratory, Madison, Wis., in 100-pound semi-commercial digesters and from studies made on the resulting pulps. It has been found, however, that the general cooking conditions, yield, bleach, consumption, etc., as determined by experimental trials for pulp made from any given wood, compare quite favorably with the results obtained in commercial practice. The data for the various mechanical pulps were obtained from the experiments carried on at the ground-wood laboratory, Wausau, Wis., where a commercial-sized grinder equipment was installed by the Forest Products Laboratory in cooperation with the American Paper and Pulp Association.

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*Much of the data used in this report has been collected at a previous date by Henry E. Surface of our laboratory, but not for publication. We also wish to acknowledge the contributions of J. H. Thickens, Edwin Sutermeister, R. C. Cooper, G. C. McNaughton, C. K. Textor and S. E. Lunak, who, while in the employ of the Forest Service, made some of these cooks.

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The yield of pulp from any given wood depends directly upon the specific gravity of the wood or weight per cubic foot, and the pulping method employed. By varying the severity of the pulping treatment both yield and bleach consumption are changed. For example, white spruce sulphite pulp prepared for the manufacture of newsprint paper, would show an entirely different yield and bleach consumption from bleached white spruce pulp prepared for use in a white bond paper. It is, therefore, evident that the character and use of the pulp will largely decide the severity of the cooking operation. Certain woods, such as western larch, containing a high percentage of galactan, which is water-soluble, will show a decreased yield by either mechanical or chemical pulping.

Pulping data have been given for woods such as red and white oak, white ash and certain other woods not because we consider these species suitable for pulp purposes, but because the information was available. Many wood-using plants produce considerable tonnage of slabs and mill waste of woods not especially suitable for pulp production, and are interested in a possible outlet for this waste. In some cases, at their direct request pulping trials have been made on woods known to be unsuitable for pulping purposes. The various woods have been listed, giving the official name as recognized by the Forest Service, also the common names in use and the range covering the growth of that particular species. This information has been taken directly from the "Check List of the Forest Trees of the United States," by George B. Sudworth.

In considering the pulping and other data given for the various woods, attention is drawn to the following points:

1. The weights of wood given are for bone-dry material per solid cubic foot. This is obtained by multiplying the specific gravity of the over-dried wood based on the green volume by 62.3lb (the weight of a cubic foot of water).

2. The fiber lengths as given are the average of all the available data taken from the Forest Service investigations and from other sources. Many of the measurements given are the results of averages of thousands of determinations; in other cases from only a few determinations.

3. The yield figures represent the yield of bone-

dry screened and unbleached pulp per hundred cubic feet of solid bone-dry wood. It is our opinion that in general the ordinary cord of 128 cubic feet of rossed wood piled 4′ x 4′ x 8′ closely approximates 100 solid cubic feet of wood. To convert the yields on bone-dry basis to air-dry pulp containing 10 percent moisture divide the yield by 0.9.

The yield data are based on results obtained from experimental runs made under very favorable conditions. The pulp logs on arrival at the laboratory are barked, sawed into convenient size and any wood containing knots and decayed spots is rejected. The chips are carefully sorted and are far more uniform in size and moisture content than can be obtained in commercial practice unless the mills operate under more favorable conditions than ordinarily exist. Further, each cook representing an individual experiment, it is possible to press, shred, sample and screen the pulp with fewer mechanical losses than is feasible in handling the pulp in commercial practice from the blow pit to the wet machine or to the finished paper.

4. The comparison of the character and uses of the various pulps that may be obtained from the different woods offers certain difficulties. It has, therefore, been decided to consider white spruce as the standard wood for pulping by the sulphite, sulphate and mechanical processes and to compare the pulp that might be obtained from any given wood by this process of pulping with the pulp obtained from white spruce. Aspen wood has likewise been adopted as the standard for reduction by the soda process, and soda pulps from other woods will be compared with it.

No figures have been given on the bleaching of the sulphate pulps as we do not know of any mills making bleached sulphate pulp in this country at the present time. By this we do not mean to imply that sulphate pulp cannot be economically bleached, but this is not the present mill practice.

Further, no data are given on the possible soda pulping of the various firs, pines, hemlocks, larch, tamarack and other woods that can be reduced by the sulphate process. The laboratory has made extensive pulping trials on the reduction of these woods by the soda process and it is, of course, recognized that this process can be and is at present employed to a limited extent for reduction of certain of these woods. In general, the soda process can be used for reduction

of any wood suitable for the production of sulphate pulp, where the stock is not to be bleached and where strength is of primary consideration. These soda pulps from coniferous woods could, of course, through a severe pulping treatment, be bleached with a reasonable bleach consumption.

No figures have been given for bleach consumption. It has appeared advisable to compare the ease of bleaching for any given pulp with the standard white spruce sulphite and aspen soda pulp.

The data given must, of course, be interpreted with the understanding that the figures and results are based on experimental pulping trials. We believe that it may be of interest if used with this reservation for comparing the character and yields of pulps that may be expected from different woods.

BLACK SPRUCE—Picea mariana. Wt. 23lb. Fiber 2.6 m.m.

Range—Newfoundland to Hudson Bay and northwestward to the Mackenzie river; southward in Michigan, Wisconsin, Minnesota, and in the eastern mountains to North Carolina and Tennessee.

Common Names—Black spruce (N. H., Vt., Mass., R. I., N. Y., Pa., W. Va., N. C., S. C., Wis., Mich., Minn., Ont., Eng.); Double Spruce (Me., Vt., Minn.); Blue Spruce (Wis.); Spruce (Vt.); White Spruce (W. Va.); Yew Pine (W. Va.); Juniper (N. C.); Spruce Pine (W. Va., Pa.); He Balsam (Del. N. C.); Epinette Jaune (Quebec); Water Spruce (Canada, Me.).

Sulphite Pulp

Yield 1,050lb. Easily bleached.

Easily pulped—Excellent strength and color.

Possible Uses—Same as white spruce.

Sulphate Pulp

Yield 1,150lb.

Character and Uses—Similar to white spruce.

BLUE SPRUCE—Picea parryana. Wt. 23lb. Fiber 2.8 m.m.

Range—Central Rocky Mountain region—Colorado, Utah and Wyoming.

Common Names—Parry's Spruce (Utah); Blue Spruce (Colo.); Spruce Balsam (Colo., Utah); White Spruce (Colo., Utah); Silver Spruce (Colo.); Colorado Blue Spruce (Colo.); Prickly Spruce (lit.).

Sulphite Pulp

Yield 1,050lb. Easily bleached.

Easily pulped. Excellent strength and color.

Possible Uses—Same as white spruce.

Sulphate Pulp

Yield 1,150lb.

Character and Uses—Similar to white spruce.

ENGELMANN SPRUCE—Picea engelmanni. Wt. 21lb. Fiber 3 m.m.

Range—Northern Arizona and through the Rocky Mountain region to British Columbia.

Common Names—Engelmann's Spruce (Utah); Balsam (Utah); White Spruce (Oreg., Colo., Utah, Idaho); White Pine (Idaho); Mountain Spruce (Mont.); Arizona Spruce (Cal. lit.).

Sulphite Pulp

Yield 990lb. Easily bleached.

A little hard to pulp—excellent strength. Excellent color.

Possible Uses—Same as white spruce.

Sulphate Pulp

Yield 1,000lb.

Character and Possible Uses—Similar to white spruce.

Mechanical Pulp

Yield 2,100lb.

Character—Strong fiber of good color.

Possible Uses—Same as white spruce.

RED SPRUCE—Picea rubens. Wt. 24lb. Fiber 3.7 m.m.

Range—Nova Scotia to North Carolina and Tennessee. Range imperfectly known.

Common Names—Red Spruce; Yellow Spruce (N. Y.); North American Red Spruce (foreign lit.).

Sulphite Pulp

Yield 1,080lb. Easily bleached.

Easily pulped—good strength—excellent color.

Possible Uses—Same as white spruce.

Sulphate Pulp

Yield 1,150lb.

Character—High-grade strong fiber.

Possible Uses—Same as white spruce.

Mechanical Pulp

Yield 2,400lb.

Character—Excellent color and strength.

Possible Uses—Similar to white spruce.

SITKA SPRUCE—Picea sitchensis. Wt. 24lb. Fiber 3.5 m.m.

Range—Coast region (extending inland about fifty miles) from Alaska to northern California (Mendocino County).

Common Names—Tideland Spruce (Cal., Ore., Wash.); Menzies' Spruce; Western Spruce; Great Tideland Spruce (Cal. lit.).

Sulphite Pulp

Yield 1,080lb. Easily bleached.

Easily pulped—excellent strength and color.

Possible Uses—Same as white spruce.

Sulphate Pulp

Yield 1,150lb.

Character and Uses—Similar to white spruce.

Mechanical Pulp

Yield 2,040lb.

Character—Slightly grayish color.

Possible Uses—Similar to white spruce.

WHITE SPRUCE—Picea canadensis. Wt. 24lb. Fiber 2.8 m.m.

Range—Newfoundland to Hudson Bay and northwestward to Alaska; southward to Northern New York, Michigan, Wisconsin, Minnesota, South Dakota, Montana, and British Columbia.

Common Names—White Spruce (Vt., N. H., Mass., N. Y., Wis., Mich., Minn., Ont.); Single Spruce (Me., Vt., Minn.); Bog Spruce (New Eng.); Skunk Spruce (Wis., Me., New Eng., Ont.); Cat Spruce (Me., New Eng.); Spruce (Vt.); Pine (Hudson Bay); Double Spruce (Vt.).

Sulphite Pulp

Yield 1,030lb. Easily bleached.

Easily pulped. Excellent strength—excellent color.

Possible Uses—White spruce is considered the standard sulphite pulpwood and is used for news, wrapping, book, high-grade printings, etc.

Sulphate Pulp

Yield 1,150lb. Character—Very strong fine fiber.

Possible Uses—Highest grade of kraft paper and strong fiber board.

Mechanical Pulp

Yield 2,400lb.

Character—Excellent color and strength.

Possible Uses—For practically every purpose where groundwood pulp is required.

ALPINE FIR—Abies lasiocarpa. Wt. 21lb, Fiber ————

Range—Rocky Mountain region from Colorado to Montana and Idaho, and westward through northern Oregon and northward to Alaska (latitude 60 degrees).

Common Names—Sub-Alpine Fir (Utah); Balsam (Colo., Utah, Idaho, Oreg.); White Fir (Idaho, Mont.); White Balsam; Oregon Balsam-tree (Cal.); Pumpkin-tree; Alpine Fir; Mountain Balsam (mountains of Utah and Idaho); Down-cone Fir (lit.); Downy-cone Sub-Alpine Fir (Cal. lit.).

Sulphite Pulp

Yield 1,010lb. Easily bleached.

Easily pulped—good strength—excellent color.

Possible Uses—As a substitute for white spruce.

Sulphate Pulp

Yield 1,050lb.

Character and long fiber. Excellent strength.

Possible Uses—Same as white spruce.

Mechanical Pulp

Yield 2,070lb.

Character—White fiber, fair strength.

Possible Uses—Same as white spruce.

AMABALIS FIR—Abies amabilis. Wt. 22lb. Fiber ————

Range—From British Columbia (Fraser river and southward in the Cascade mountains) to Washington and Oregon.

Common Names—Red Fir; Red Silver Fir (Western Mountains) Fir (Cal.); Lovely Fir (Cal. lit.); Lovely Red Fir (Cal. lit.); Amabilis or Lovely Fir (Cal. lit.); "Larch" (Oreg. Lumbermen).

Sulphite Pulp

Yield 1,060lb. Easily bleached.

Easily pulped—fair strength—excellent color.

Possible Uses—As a substitute for white spruce.

Sulphate Pulp

Yield 1,100lb.

Character—Long fiber, excellent strength.

Possible Uses—Same as white spruce.

Mechanical Pulp

Yield, 1,870lb.

Character—Long fiber of excellent strength; color slightly grayish.

Possible Uses—Same as white spruce.

Balsam Fir—Abies balsamea. Wt. 21lb. Fiber 2.7 m.m.

Range—From Newfoundland and Labrador to Hudson Bay and northwestward to Great Bear Lake region, and south to Pennsylvania (and along high mountains to Virginia), Michigan and Minnesota.

Common Names—Balsam Fir (N. H., Vt., Mass., R. I., N. Y., Pa., W. Va., Wis., Mich., Minn., Nebr., Ohio, Ont.; Eng. cult.); Balsam (Vt., N. H., N. Y.); Canada Balsam (N. C.); Balm of Gilead (Del.); Balm of Gilead Fir (N. Y., Pa.); Blister Pine (W. Va.); Fir Pine (W. Va.); Firtree (Vt.); Single Spruce (N. Bruns. to Hudson Bay); Silver Pine (Hudson Bay); Sapin (Quebec); Cho-koh-tung="Blisters" (N. Y. Indians).

Sulphite Pulp

Yield 970lb. Easily bleached.

Easily pulped—good strength—excellent color.

Possible Uses—As a substitute for white spruce.

Sulphate Pulp

Yield 1,010lb.

Character—High grade kraft fiber.

Possible Uses—Same as white spruce.

Mechanical Pulp.

Yield 1,910lb.

Character—Good fiber length, strong and good color.

Possible Uses—Same as white spruce.

Grand Fir—Abies Grandis. Wt. 23lb. Fiber 3.2 m.m.

Range—Coast region from Vancouver Island to California (Mendocino County), and from Washington and Oregon to Northern Idaho and Montana.

Common Names—White Fir (Cal., Oreg., Idaho); Silver Fir (Mont., Idaho); Yellow Fir (Mont., Idaho); Oregon White Fir (Cal.); Western White Fir; Grand or Oregon White Fir (Cal. lit.); Great California Fir (lit.).

Sulphite Pulp

Yield 980lb. Easily bleached.

Easily pulped—fair strength—excellent color.

Possible Uses—As a substitute for white spruce.

Sulphate Pulp

Yield 1,140lb.

Character—Good strong grade of kraft pulp.

Possible Uses—Same as white spruce.

Mechanical Pulp

Yield 1,950lb.

Character—Good fiber, color and strength.

Possible Uses—Same as white spruce.

NOBLE FIR—Abies nobilis. Wt. 22lb. Fiber — — — —

Range—Washington (coast mountains in southwestern part of state; Olympic Mountains on Solduc river; from Mount Baker southward in the Cascade Mountains) to Oregon (Browder Ridge on head waters of McKinzie river in Lane County). Range at present but little known.

Common Names—Red Fir (Oreg.); "Larch" (Oreg. lumbermen); Noble Fir (Oreg.); Big tree; Feather Red Fir (Cal. lit.); Noble or Bracted Red Fir (Cal. lit.); Tuck Tuck (Pacific Indians).

Sulphite Pulp

Yield 1,010lb. Easily bleached.

Easily pulped—fair strength—excellent color.

Possible Uses—As a substitute for white spruce.

Sulphate Pulp

Yield 1,080lb.

Character—Good quality of strong pulp.

Possible Uses—Same as white spruce.

Mechanical Pulp

Yield 1,920lb.

Character—Very long strong fiber—good color.

Possible Uses—Same as white spruce.

RED FIR—Abies magnifica. Wt. 23lb. Fiber — — — —

Range—Southern Oregon (Cascade Mts.) and California (Mount Shasta and along the western slopes of Sierra Nevada Mountains).

Common Names—Red Fir (Cal.); California Red-bark Fir (Cal.); Magnificent Fir (Cal. lit.); California Red Fir (Cal. lit.); Golden Fir (Cal. lit.)

Sulphite Pulp

Yield 1,080lb. A little hard to bleach.

Easily pulped—good strength—fair color.

Possible Uses—As a substitute for white spruce.

Sulphate Pulp

Yield 1,150lb.

Character—Good strong fiber.

Possible Uses—Same as white spruce.

Mechanical Pulp

Yield 1,915lb.

Character—Pinkish color—fair strength.

Possible Uses—As a substitute for white spruce.

WHITE FIR—Abies concolor. Wt. 22lb. Fiber 3.5 m.m.

Range—Oregon (Siskiyou mountains) to southern Cali-

fornia (San Bernardino County); Northern Arizona and New Mexico to Colorado and Utah (Wasatch mountains).

Common Names—White Fir (Cal., Idaho, Utah, Colo.); Balsam Fir (Cal., Idaho, Colo.); Silver Fir (Cal.); Balsam (Cal.); White Balsam (Utah); Bastard Pine (Utah); Balsam-tree (Idaho); Black Gum (Utah); California White Fir (Cal.); Colorado White Fir (Cal. lit.); Concolor Silver Fir (Eng. lit.).

Sulphite Pulp

Yield 950lb. Easily bleached.

Easily pulped—good strength—good color.

Possible Uses—As a substitute for white spruce.

Sulphate Pulp

Yield 1,100lb.

Character—Good strong grade of kraft pulp.

Possible Uses—Same as white spruce.

Mechanical Pulp

Yield 2,010lb. Satisfactory color—fair strength—good fiber.

Possible Uses—Same as white spruce.

Douglas Fir—Pseudotsuga taxifolia.

Washington and Oregon. Wt. 28lb. Fiber and 4.4 m.m.
Montana and Wyoming—Wt. 25lb. Fiber — — — —

Range—From the Rocky Mountain region (in United States) and northward to central British Columbia; Pacific Coast.

Common Names—Red Fir (Oreg., Wash., Idaho, Utah, Mont., Colo.); Douglas Spruce (Cal., Colo., Mont.); Douglas Fir (Utah, Oreg., Colo.); Yellow Fir (Oreg., Mont., Idaho, Wash.); Spruce (Mont.); Fir (Mont.); Oregon Pine (Cal., Wash., Oreg.); Red Pine (Utah, Idaho, Colo.); Puget Sound Pine (Wash.); Douglas-tree; Cork-barked Douglas Spruce.

Sulphite Pulp

Yield 850lb. Difficult to bleach. Hard to pulp. Fair strength—poor color.

Possible Uses—Few.

Sulphate Pulp

Yield 1,170lb.

Character—Good grade of kraft pulp but not as strong as white spruce.

Possible Uses—Similar to white spruce.

Hemlock—Tsuga canadensis. Wt. 24lb. Fiber 3.0 m.m.

Range—Nova Scotia to Minnesota (Carleton County), Wisconsin, Michigan, and southward in the Atlantic region along the mountains to Northern Alabama (Winston county) and Georgia.

Common Names—Hemlock (Me., N. H., Vt., Mass., R. I., Conn., N. Y., N. J., Pa., Del., Va., N. C., S. C., Ky., Wis., Mich., Minn., Ohio, Ont.); Hemlock Spruce (Vt., R. I., N. Y., Pa., N. J., W. Va., N. C., S. C., England, cult.); Spruce (Pa., W. Va.); Spruce Pine (Pa., Del., Va., N.

C., Ga.); Oh-neh-tah="Greens on the stick" (N. Y. Indians); Canadian Hemlock (lit.); New England Hemlock (lit.).

Sulphite Pulp

Yield 1,080lb. A little hard to bleach.

Not easily pulped. Good strength—fair color.

Possible Uses—As a substitute for white spruce.

Sulphate Pulp

Yield 1,150lb.

Character—Good strong pulp.

Possible Uses—Similar to white spruce.

Mechanical Pulp

Yield 2,030lb.

Character—Pinkish color—short fiber.

Possible Uses—As a substitute for white spruce.

WESTERN HEMLOCK—Tsuga heterophylla. Wt. 23lb. Fiber 2.7 m.m.

Range—Alaska to Idaho and Montana and southward (in the Cascade and coast ranges) to California (Marin County).

Common Names—Hemlock Spruce (Cal.); Western Hemlock (Cal.); Hemlock (Oreg., Idaho, Wash.); Western Hemlock Spruce (lit.); California Hemlock Spruce; Western Hemlock Fir (Eng.); Prince Albert's Fir (Eng.); Alaska Pine (Northwestern lumbermen.)

Sulphite Pulp

Yield 1,050lb. Easily bleached.

Easily pulped—good strength—fair color.

Possible Uses—Same as white spruce.

Sulphate Pulp

Yield 1,100lb.

Character—Good strong fiber.

Possible Uses—Similar to white spruce.

Mechanical Pulp

Yield 2,160lb.

Character—Good strength and fiber—grayish color.

Possible Uses—Similar to white spruce.

TAMARACK—Larix laricina. Wt. 31lb. Fiber 2.6 m.m.

Range—From Newfoundland and Labrador to northern Pa., northern Indiana, Illinois, central Minnesota, and northwestward to Hudson Bay (Cape Churchill, Great Bear Lake, and Mackenzie River) (in Artic Circle).

Common Names—Larch (Vt., Mass., R. I., Conn., N. Y., N. J., Pa., Del., Wis., Minn., Ohio, Ont.); Tamarack (Me., N. H., Vt., Mass., R. I., N. Y., N. J., Pa., Ind., Ill., Wis., Mich., Minn., Ohio, Ont.); Hackmatack (Me., N. H., Mass., R. I., Del., Ill., Minn., Ont.); American Larch (Vt., Wis., nurserymen); Juniper (Me., N. Bruns. to Hudson Bay); Black Larch (Minn.); Epinette Rouge (Quebec); Ka-neh-tens="The leaves fall" (Indians, N. Y.); Red Larch (Mich.); Hacmack (lit.).

Sulphite Pulp

Yield 1,270lb. Difficult to bleach.

Difficult to pulp—good strength—poor color.

Possible Uses—Low grade wrappings.

Sulphate Pulp

Yield 1,400lb.

Character—Strong, tough pulp.

Possible Uses—Similar to white spruce.

Mechanical Pulp

Yield 2,620lb.

Character—Short fibered and gray color.

Possible Uses—As a substitute for white spruce.

WESTERN LARCH—Larix occidentalis. Wt. 28lb. Fiber 2.6 m.m.

Range—Southern British Columbia (south of latitude 53 degrees) and south in the Cascade Mountains to the Columbia River and to western Montana; also in Blue Mountains of Washington and Oregon.

Common Names—Tamarack (Oreg.); Hackmatack; Larch (Idaho, Wash., etc.); Red American Larch; Western Hamarack; Western Larch (Eng.); Great Western Larch (Cal. lit.).

Sulphite Pulp

Yield 1,200lb. Difficult to bleach. Difficult to pulp—poor strength and color.

Possible Uses—Low grade wrappings.

Sulphate Pulp

Yield 1,290lb.

Character—Good quality of kraft fiber.

Possible Uses—Same as white spruce.

Mechanical Pulp

Yield 2,100lb.

Character—Brown color, short fiber and fair strength.

Possible Uses—Where a medium quality of groundwood will answer the purpose.

JACK PINE—Pinus divaricata. Wt. 24lb. Fiber 2.5 m.m.

Range—New Brunswick to New Hampshire and west through Great Lake and Hudson Bay (southern shores) region to Great Bear Lake, Mackenzie river, and Rocky Mountains; south into northern Maine, northern New York, northern Indiana and Illinois, and central Minnesota.

Common Names—Scrub Pine (Me., Vt., N. Y., Wis., Mich., Minn., Ont.); Gray Pine (Vt., Minn., Ont.); Jack Pine (Mich., Minn., Canada); Princes Pine (Ont.); Black Jack Pine (Wis.); Black Pine (Minn.); Cypress (Quebec to Hudson Bay); Canada Horn-cone Pine (Cal. lit.); Chek Pine; Sir Joseph Bank's Pine (Eng.); "Juniper" (Canada); Banksian Pine (lit.).

Sulphite Pulp

Yield 1,080lb. Very difficult to bleach.

Not easily pulped—fair strength—poor color.

Pulp shivey and full of pitch.

Possible Uses—Mechanical difficulties when running this pulp over the paper machine prevent its use.

Sulphate Pulp

Yield 1,150lb.

Character—Very strong tough fiber.

Possible Uses—Similar to white spruce.

Mechanical Pulp

Yield 2,130lb.

Character—Gray, somewhat soft, good strength, pitchy, poor finish.

Possible Uses—Medium grades of groundwood.

LOBLOLLY PINE—Pinus taeda. Wt. 30lb. Fiber 3.0 m.m.

Range—South Atlantic and Gulf States from New Jersey (Cape May), southern Delaware and West Virginia (Wood, Mineral, Hampshire, and Hardy counties) to central Florida (Cape Malabar and Tampa Bay) and west to eastern Texas (Colorado River; in Bastrop County); northward into south eastern Indian Territory, Oklahoma, Arkansas, and southern border of middle and west Tennessee.

Common Names—Loblolly Pine (Del., Va., N. C., S. C., Ga., Ala., Fla., Miss., La., Tex., Ark.); Oldfied Pine (Del., Va., N. C., S. C., Ga., Ala., Fla., Miss., La., Tex., Ark.); Torch Pine (Eng. lit.); Rosemary Pine (Va., N. C., in part); Slash Pine (Va., N. C., in part); Longschat Pine (Del.); Longshucks (Md., Va.); Black Slash Pine (S. C.); Frankincense Pine (lit.) Shortleaf Pine (Va., N. C., S. C., La.); Bull Pine (Texas and Gulf region); Virginia Pine; Sap Pine (Va., N. C.); Meadow Pine (Fla.); Cornstalk Pine (Va.); Black Pine (Va.); Foxtail Pine (Va., Md.); Indian Pine (Va., N. C.); Spruce Pine (Va., in part); Bastard Pine (Va., N. C.); Yellow Pine (north Ala., N. C.); Swamp Pine (Va., N. C.); Longstraw Pine (Va., N. C., in part).

Sulphite Pulp

Yield 1,140lb. Difficult to bleach.

Easily pulped—Good strength and color.

Possible Uses—As a substitute for white spruce.

Sulphate Pulp

Yield 1,420lb.

Character—Strong but coarse fiber.

Possible Uses—Similar to white spruce.

Mechanical Pulp

Yield 2,450lb.

Character—Short fiber and very pitchy.

Possible Uses—Only when mixed with better grades of groundwood fibers.

LODGEPOLE PINE—Pinus murrayana. Wt. 24lb. Fiber 2.3 m.m.

Range—From Alaska (Yukon river) and southward through interior British Columbia; the mountains of Washington and Oregon to California (Sierra Nevada Mountains to San Jacinto Mountains); plateau east of

the Rocky Mountains (latitude 56) and south through the Rocky Mountain region to New Mexico and northern Arizona. Also Coast region from Alaska to California (Mendocino county).

Common Names—Tamarack (Wyo., Utah, Mont., Cal.); Prickly Pine (Utah); White Pine (Mont.); Black Pine (Wyo.); Lodgepole Pine (Wyo., Mont., Idaho); Spruce Pine (Colo., Idaho, Mont.); Tamarack Pine (Cal.); Murray Pine (Cal. lit.); Scrub Pine; Knotty Pine, Sand Pine (Oreg.); Bolander's Pine; Henderson's Pine; North Coast Scrub Pine (Cal. lit.).

Sulphite Pulp

Yield 1,080lb. A little hard to bleach.

Easily pulped. Excellent strength and color.

Possible Uses—As a substitute for white spruce.

Sulphate Pulp

Yield 1,120lb.

Character and Uses—Same as white spruce.

Mechanical Pulp

Yield 2,140lb.

Character and Uses—A little pitchy but otherwise similar to white spruce.

Note—The lodgepole pine which grows in the lowlands in the coastal region is very similar to jack pine. The Rocky Mountain region lodgepole pine, however, contains much less pitch and is to be preferred for sulphite and mechanical pulps.

Longleaf Pine—Pinus palustris. Wt. 34lb. Fiber 3.7 m.m.

Range—Coast region, from southern Virginia (Norfolk) to Florida (Tampa Bay and Cape Canaveral) to eastern Texas (Trinity River); northward in Alabama to the northeastern part of the state (Clay and Walker counties) and northwestern (border counties) Georgia.

Common Names—Longleaved Pine (Va., N. C., S. C., Ga., Ala., Fla., Miss., La., Tex.); Southern Pine (N.C., Ala., Miss., La.); Yellow Pine (Del., N. C., S. C., Ala., Fla., La., Tex.); Turpentine Pine (N. C.); Rosemary Pine (N. C.); Brown Pine (Tenn.); Hard Pine (Ala., Miss., La.); Georgia Pine (general, Del.); Fat Pine (Southern States); Southern Yellow Pine (general); Southern Hard Pine (general); Southern Heart Pine (general); Southern Pitch Pine (general); Heart Pine (N. C. and South Atlantic region); Pitch Pine (Atlantic region); Longleaved Yellow Pine (Atlantic region); Longleaved Pitch Pine (Atlantic region); Longstraw Pine (Atlantic region); North Carolina Pitch Pine (Va., N. C.); Georgia Yellow Pine (Atlantic region); Georgia Heart Pine (general); Georgia Longleaved Pine (Atlantic region); Georgia Pitch Pine (Atlantic region); Florida Yellow Pine (Atlantic region) Florida Pine (Atlantic region); Florida Longleaved Pine (Atlantic region); Texas Yellow Pine (Atlantic region); Texas Longleaved Pine (Atlantic region).

Sulphite Pulp

Yield 1,840lb. (crude pulp). Cannot be bleached. Very poor color. In general, this wood cannot be considered satisfactory for sulphite pulp.

Possible Uses—Few.

Sulphate Pulp

Yield 1,600lb.

Character—Strong but coarse fiber.

Possible Uses—Similar to white spruce.

Norway Pine—Pinus resinosa. Wt. 27lb. Fiber 3.7 m.m.

Range—From Newfoundland and along the northern shores of St. Lawrence Gulf to northern Ontario (north of Abitibi Lake) to southern Manitoba (near southern end of Lake Winnipeg); southward through the Northern States to Massachusetts (Middlesex County), Pennsylvania (Chester County), northeastern Ohio (north of Cleveland) central Michigan (Saginaw), northern Wisconsin (Oshkosh and Eau Claire), and northeastern Minnesota.

Common Names—Red Pine (Vt., N. H., N. Y., Wis., Minn., Ont.); Norway Pine (Me., N. H., Vt., Mass., N. Y., Wis., Mich., Minn., Ont.); Hard Pine (Wis.); Canadian Red Pine (Eng.).

Sulphate Pulp

Yield 1,350lb.

Character and Possible Uses—Similar to white spruce.

Pitch Pine—Pinus Rigida. Wt. 29lb. Fiber — — — —

Range—From southern New Brunswick (St. Johns river) to eastern Ontario (north shore of Lake Ontario and lower Ottawa River) and southward in the Atlantic region to southern Virginia (Norfolk) and along the mountains to northern Georgia (Atlanta); west to western New York (Ithaca), northeastern Pennslyvania, eastern Ohio (border counties south of Canton) and Kentucky, eastern Tennessee (to Cumberland Mountains).

Common Names—Pitch Pine (Vt., N. H., Mass., R. I., Conn., N. Y., N. J., Pa., Del., W. Va., N. C., S. C., Ga., Ohio, Ont., Md., Eng.); Longleaved Pine (Del.); Longschat Pine (Del.); Black Norway Pine (N. Y.); Hard Pine (Mass.); Yellow Pine (Pa.); Black Pine (N. C.); Rigid Pine (Eng. lit.); Sap Pine (lit.).

Sulphate Pulp

Yield 1,430lb.

Character and Uses—Similar to white spruce.

Sand Pine—Pinus clausa. Wt. 29lb. Fiber — — — —

Range—Coast of Alabama (Baldwin County) and western Florida (to Pease Creek); east coast of Florida from St. Augustine to Halifax River.

Common Names—Sand Pine (Fla., Ala.,); Oldfield Pine (Fla.); Florida Spruce Pine (Ala.); Scrub Pine (Fla.); Spruce Pine (Fla.) Upland Spruce Pine (Fla.).

Sulphite Pulp

Yield 1,300lb. Difficult to bleach, and shivey.

Easily pulped—fair strength—good color.

Possible Uses—As a substitute for white spruce.

Sulphate Pulp

Yield 1,220lb.

Character and Uses—Similar to white spruce.

SCRUB PINE—Pinus virginiana. Wt. 26lb. Fiber 2.8 m.m.

Range—From New York (Staten Island) to South Carolina (Aiken River) and northern Alabama (Winston, Cullman, and Dekalb counties); west into southern Indiana, to middle Tennessee (Putnam County).

Common Names—Jersey Pine (N. J., Pa., Del., N. C., S. C.); Scrub Pine (R. I., N. Y., Pa., Del., N. C., S. C., Ohio); Short Shucks (Md., Va.); Shortshat Pine (Del.); Spruce Pine (N. J., N. C.); Shortleaved (N. C.); Cedar Pine (N. C.); River Pine (N. C.); Nigger Pine, Tenn.); New Jersey Pine (lit.).

Sulphite Pulp

Yield 1,000lb.

Difficult to bleach, easily pulped and good color.

Possible Uses—As a substitute for spruce.

Sulphate Pulp

Yield 1,250lb.

Character—Strong but coarse fiber.

Possible Uses—Similar to white spruce.

SUGAR PINE—Pinus lambertiana. Wt. 23lb. Fiber 4.1 m.m.

Range—Coast region from Oregon (head of McKinzie and Rogue rivers) to California (Sierra Nevada Mountains and coast ranges to Santa Lucia Mountains; San Bernardino and Cuyamaca mountains).

Common Names—Sugar Pine (Cal., Oreg.); Big Pine; Shade Pine (Cal.); Great Sugar Pine; Little Sugar Pine; Gigantic Pine (Cal. lit.); Purple-coned Sugar Pine.

Sulphite Pulp

Yield 1,010lb. A little difficult to bleach.

Easily pulped. Poor strength—fair color.

Possible Uses—Dark colored wrappings.

Sulphate Pulp

Yield 1,150lb.

Character and Uses—Similar to white spruce.

WESTERN YELLOW PINE—Pinus ponderosa. Wt. 24lb. Fiber 3.6 m.m.

Range—From British Columbia (interior south of latitude 51°), and Dakota (Black Hills region), southward in the Pacific and Rocky Mountain region to western Texas and Mexico.

Common Names—Yellow Pine (Cal., Colo., Mont., Idaho, Utah, Wash., Oreg.); Bull Pine (Cal., Wash., Utah, Idaho, Oreg.); Big Pine (Mont.); Longleaved Pine (Utah, Nev.); Red Pine; Pitch Pine; Southern Yellow Pine; Heavy-wooded Pine (Eng.); Western Pitch

Pine; Heavy Pine (Cal.); Foothills Yellow Pine; Sierra Brownbark Pine; Montana Black Pine (Cal lit.); "Gambier Parry's Pine" (Eng. lit.).

Sulphite Pulp

Yield 1,130lb. Difficult to bleach, shivy.

Not difficult to pulp. Very poor strength and color.

Possible uses—Few.

Sulphate Pulp

Yield 1,100lb.

Character—Fine, high grade, very strong, and tough fiber.

Possible Uses—Same as white spruce.

Mechanical Pulp

Yield 2,060lb.

Character—Fibers are long, coarse and soft, creamy color and somewhat pitchy.

Possible Uses—Where a medium quality of groundwood will answer the purpose.

WHITE PINE—Pinus strobus. Wt. 22lb. Fiber 3.8 mm.

Range—From Newfoundland (White Bay region) and along the northern shores of St. Lawrence Gulf to northern Ontario (near Abitibi and Nipigon lakes) southern Manitoba (near southern end of Lake Winnipeg); southward through northern and eastern Minnesota, northeastern (Mitchell county) and eastern border of Iowa (to Scott county), northern (counties) Illinois, southern shores of Lake Michigan, southern Michigan (north of Allegan, Eaton, and St. Clair counties), northeastern and eastern (border counties) Ohio, and along the Allegheny Mountains to northern Georgia (Tallulah Falls).

Common Names—White Pine (Me., N. H., Vt., Mass., R. I., Conn., N. Y., N. J., Pa., Del., Va., W. Va., N. C., Ga., Ind., Ill., Wis., Mich., Minn., Ohio, Ont., Nebr.); Weymouth Pine (Mass., S. C.); Soft Pine (Pa.); Northern Pine (S. C.); Spruce Pine (Tenn).

Sulphite Pulp

Yield 1,210lb. Difficult to bleach.

Difficult to pulp. Fair strength, but shivey and poor color.

Possible Uses—Few.

Sulphate Pulp

Yield 1,100lb.

Character—Excellent strength and color.

Possible Uses—Similar to white spruce.

Mechanical Pulp

Yield 1,890lb.

Character—Good strength and color, but pitchy.

Possible Uses—Similar to white spruce.

INCENSE CEDAR—Libocedrus decurrens. Wt. 23lb. Fier 2.0.m.m.

Range—From Oregon (North Fork of Sanitam River and southward on the Western slopes of the Cascade Mountains through California (Western slopes of Sier-

ra Nevada Mountains and coast ranges from southern border of Mendocino County to San Bernardino, San Jacinto, and Cuyamaca mountains); Western Nevada; Lower California (Mount San Pedro Martir).

Common Names—White Cedar (Cal., Oreg.); Cedar (Cal., Oreg.); Incense Cedar (Cal., Oreg.); Post Cedar (Cal., Nev.); Juniper (Nev.); Bastard Cedar (Cal., Wash.); Red Cedar; California Post Cedar (Cal. lit.).

Sulphite Pulp

Yield 830lb. Difficult to bleach.

Good strength—poor color.

Possible Uses—Few.

Sulphate Pulp

Yield 950lb.

Character—Dark colored, strong and hard fiber.

Possible Uses—As a substitute for white spruce.

Bald Cypress—Taxodium distichum. Wt. 27lb. Fiber 3.3 m.m.

Range—From southern Delaware (Sussex County and southward in the coast region) to Florida (Mosquito Inlet and Cape Romano); westward in the Gulf coast region to Texas (Devils River); and northward through Louisiana, Arkansas, and eastern Mississippi and Tennessee, southeastern Missouri, western and northwestern Kentucky, southern Illinois, and southwestern Indiana (Knox county).

Common Names—Bald Cypress (Del., N. C., S. C., Ala., La., Fla., Tex., Ark., Mo., Ill., Ind.); White Cypress (N. C., S. C., Fla., Miss.); Black Cypress (N. C., S. C., Ala., Tex.); Red Cypress (Ga., Miss., La., Tex.); Swamp Cypress (La.); Cypress (Del., N. C., S. C., Fla., Miss., Ky., Mo., Ill.); Deciduous Cypress (Del., Ill., Tex.); Southern Cypress (Ala.).

Sulphite Pulp

Yield 1,160lb. Very difficult to bleach.

Difficult to cook—poor strength and color.

Possible Uses—Few.

Sulphate Pulp

Yield 1,350lb.

Character—Fiber long but tender.

Possible Uses—As a substitute for white spruce.

Redwood—Sequoia sempervirens—Wt. 23lb. Fiber 5.5 m.m.

Range—From the southern borders of Oregon (on Chetco River(about six miles from mouth, and on Winchuck River), and southward in the coast region (twenty to thirty miles inland) through California (to Salmon Creek Canyon, twelve miles south of Punta Gorda, Monterey County).

Common Names—Sequoia (Cal.); Coast Redwood (Cal.); Redwood (Cal. and Am. lit.); California Redwood (Eng. lit.).

Sulphite Pulp

Yield 920lb. Difficult to bleach.

Easily pulped—fair strength—dark colored.
Possible Uses—Low grade wrappings.

Sulphate Pulp
Yield 950lb.
Character—Long fibered but tender.
Possible Uses—As a substitute for spruce.

WHITE ASH—Fraxinus americana. Wt. 34lb. Fiber 1.2 m.m.
Range—From Nova Scotia and Newfoundland to Florida and westward to Ontario and northern Minnesota, eastern Nebraska, Kansas, Oklahoma and Texas (Trinity River).
Common Names—White Ash (Me., N. H., Vt., Mass., R. I., Conn., N. Y., N. J., Del., Pa., Va., W. Va., N. C., S. C., Ga., Fla., Ala., Miss., La., Tex., Ky., Mo., Ill., Ind., Iowa, Kansas, Nebr., Mich., Ohio, Ont., Minn., N. Dak., Wis.); Ash (Ark., Iowa, Wis., Ill., Mo., Minn.); American Ash (Iowa); Franc-Frene (Quebec); Cane Ash (Ala., Miss., La.).

Sulphite Pulp
Yield 1,530lb. A little hard to bleach.
Easily pulped. Very weak. Poor color.
Possible Uses—Few.

Soda Pulp
Yield 1,350lb.
Character—Very difficult to reduce and bleach.
Possible Uses—few.

ASEN—Populus tremuloides. Wt. 23lb. Fiber 1.0.m.m.
Range—Southern Laborador to Hudson Bay (southern shores) and northwestward to the MacKenzie River (near mouth and Alaska (Yukon River); southward to Pa. (mountains), northeastern Missouri, southern Nebraska, and throughout the western mountains to northern New Mexico and Arizona and central California; Lower California (San Pedro Matir Mountains) and Mexico (mountains to Chicuahua).
Common Names—Aspen (N. H., Mass., R. I., Conn., N. Y., N. J., Pa., Del., Ill., Ind., Wis., Mich., Minn., N. Dak., Nebr., Ohio, Ont., Oreg., Utah, Idaho, Nev., Mont., Colo., Cal.); Quaking Asp (N. Y., Pa., Del., Cal., N. Mex., Idaho, Colo., Ariz., Ill., Iowa, Minn., Mont., Nebr., Utah, Oreg., Nev.); Mountain Asp (Mont.); American Aspen (Vt.); Aspen Leaf (Pa.); White Poplar (Mass.); Trembling Poplar (Minn., Col.); American Poplar (Minn., Colo.); Poplar (Vt., N. Y., Ill., Ind., Minn., Mont.); Popple (Wis., Iowa, Mont.); Tremble (Quebec); Trembling Aspen (Iowa); Aspen Poplar (Cal., Mont.)

Sulphite Pulp
Yield 1,030lb. Easily bleached.
Easily pulped—very weak—excellent color.
Possible Uses—Used with longer fibered stock for better grade of papers.

Soda-Pulp

Yield 1,080lb.

Character—Soft and short fibered—easily bleached.

Possible Uses—When bleached and mixed with longer fibered bleached stock is well adapted for book, envelope, and high grade printings.

Mechanical Pulp

Yield 2,170lb.

Character—Short fibered, poor strength, good color but may have black specks present.

Possible Uses—As a filler when used with longer fibered stocks.

COTTONWOOD—Populus deltoides. Wt. 23lb. Fiber 1.3 m.m.

Range—From Quebec (Lower Maurice River) and Vermont (Lake Champlain) through western New England and New York, Pa. (west of Alleghenies), Maryland, and Atlantic States to western Florida and west to the Rocky Mountains from southern Alberta to northern New Mexico.

Common Names—Cottonwood (N. H., Vt., Mass., R. I., N. Y., N. J., W. Va., N. C., Ala., Fla., Miss., La., Tex., Cal., Ky., Mo., Ill., Wis., Kans., Nebr., Iowa., Minn., Mich., Ohio, Ont., Colo., Mont., N. Dak., S. Dak.); Big Cottonwood (Miss., Neb.); Yellow Cottonwood (Ark., Iowa, Neb.); Cotton-tree (N. Y.); Carolina Poplar (Pa., Miss., La., N. Mex., Ind., Ohio) Necklace Poplar (Texas, Colo.); Vermont Poplar (Vt.) Whitewood (Iowa); Broad-leaved Cottonwood (Colo.).

Sulphite Pulp

Yield 1,035lb. Easily bleached.

Easily pulped—very weak. Excellent color.

Possible Uses—Same as aspen.

Soda Pulp

Yield 1,030lb.

Character—Soft and easily bleached.

Possible Uses—Same as aspen.

Mechanical Pulp

Yield 2,180lb.

Character—short fibered, weak, good color.

Possible Uses—As a filler when used with longer fibered stocks.

BASSWOOD—Tilia americana. Wt. 21lb. Fiber 1.1 m.m.

Range—New Brunswick to Virginia and (along Alleghany Mountains) to Georgia and Alabama (mountains); west (in Canada) to Lake Superior (eastern shores) and to Lake Winnipeg (southern shores) and Assiniboine River (in United States), to eastern Dakota, eastern Neb., Kansas, Oklahoma, and eastern Texas.

Common Names—Basswood (Me., N. H., Vt., R. I., Mass., Conn., N. Y., N. J., Del., Pa., W. Va., D. C., N. C., S. C., Ga., Ala., Miss., La., Ark., Ky., Ill., Ind., Iowa, Wis., Mich., Ohio, Ont., Neb., Kans., Minn., N. Dak.); American Linden (Me., N. H., R. I., N. Y.,

Pa., Del., N. C., Miss., Ohio, Ill., Neb., N. Dak., Ont., Minn.); Linn (Pa., Va., W. Va., Ala., La., Ill., Ind., Ohio, Mo., Iowa, Kans., Nebr., Wis., S. Dak.); Linden (Vt., R. I., Pa., W. Va., Nebr., Minn.); Limetree (R. I., N. C., S. C., Ala., Miss., La., Ill.); Whitewood (Vt., W. Va., Ark., Minn., Ont.,); Beetree (Vt., W. Va., Wis.); Black Limetree (Tenn.); Smooth-leaved Limetree (Tenn.); White Lind (W. Va.); Wickup (Mass.); Yellow Basswood (Ind.); Lein (Ind.)

Soda Pulp

Yield 1,020lb.

Character—Soft and easy bleaching.

Possible Uses—Similar to aspen.

Paper Birch—Betula papyrifera. Wt. 34lb. Fiber 1.2 m.m.

Range—From Labrador to Hudson Bay (southern Shores), Great Bear Lake, Yukon River and coast of Alaska; southward to New York (Long Island) and northern Pa., central Michigan, and Minnesota, northern Nebraska (Bluffs of Niobrara River), Dakota (Black Hills), northern Montana, and northwestern Washington (near Seattle).

Common Names—Paper Birch (N. H., Vt., Mass., R. I., Conn., N. Y., Wis., Mich., Minn., Ont.); Canoe Birch (Me., Vt., N. H., R. I., Mass., N. Y., Pa., Wis., Minn., Ont.); White Birch (Me., N. H., Vt., R. I., N. Y., N. J., Wis., Minn., Mich., Nebr., Ont.); Silver Birch (Minn., N. Y.); Large White Birch (Vt.); Boleau (Quebec).

Sulphite Pulp

Yield 1,500lb. Difficult to bleach.

Easily pulped—poor strength and color.

Possible Uses—Few.

Soda Pulp

Yield 1,350lb.

Character—More difficult to reduce than aspen—soft, easily bleached.

Possible Uses—Similar to aspen.

Mechanical Pulp

Yield 3,000lb.

Character—Pinkish color—short fiber and poor strength.

Possible Uses—As a filler with long fibered stocks.

Yellow Birch—Betula lutea. Wt. 34lb. Fiber 1.5 m.m.

Range—From Newfoundland and along the northern shores of St. Lawrence Gulf to Abitibi Lake and Rainy River; southward to northern Minnesota and through the Northern States to eastern Tennessee, North Carolina, and Delaware.

Common Names—Yellow Birch (Me., N. H., Vt., Mass., Conn., R. I., N. Y., N. J., Pa., N. C., S. C., Ill., Mich., Wis., Minn., N. Dak., Ont.); Gray Birch (Vt., R. I., Pa., Mich., Minn.); Swamp Birch (Minn.); Silver

Birch (N. H.); Merisier (Quebec); Merisier Rouge (Quebec).

Sulphite Pulp

Yield 1,590lb. Easily bleached.

Easily pulped—very weak—good color.

Possible Uses—Same as aspen.

Soda Pulp

Yield 1,360lb.

Character—More difficult to reduce than aspen—soft, easily bleached.

Possible Uses—Same as aspen.

CHESTNUT—Castanea dentata—Wt. 25lb. Fiber 1.0 m.m.

Range—From southern Maine to northwestern Vermont (Winooski River), southern Ontario, and southern shores of Lake Ontario to southeastern Michigan; southward to Delaware and southeastern Indiana, and on the Allegheny Mountains to central Kentucky and Tennessee, central Alabama, and Mississippi.

Common Names—Chestnut (Me., N. H., Vt., Mass., R. I., Conn., N. Y., N. J., Pa., Del., Va., W. Va., N. C., Ga., Ala., Miss., Ky., Mo., Mich., Ont.); O-heh-yah-taf"="Prickly Burr" (Indians, N. Y.).

Sulphite Pulp

Not pulped.

Soda Pulp

Yield (on extracted chips) 950lb.

Character—Soft, easy bleaching, and a little hard to cook.

Possible Uses—Similar to aspen. (Unextracted wood can be pulped but is very difficult to reduce and bleach.)

CUCUMBER-TREE—Magnolia acuminata. Wt. 27lb. Fiber 1.3 m.m.

Range—From western New York through southern Ontario to southern Illinois and south in the Appalachian Mountains to southern Alabama (Stockton) and northeastern Mississippi (Meridian); central Kentucky and Tennessee (near Nashville and eastern part of State); northeastern, southern, and southwestern Arkansas.

Common Names—Cucumber-tree (R. I., Mass., N. Y., Pa., D. C. (cult.), N. C., S. C., Ala., Miss., La., Ark., Ky., W. Va., Ohio, Ind., Ill.); Mountain Magnolia (Miss., Ky.); Cucumber (W. Va.); Black Lin (W. Va.); Magnolia (Ark.); Pointed-leaved Magnolia (lit.)

Soda Pulp

Yield 1,200lb.

Character—A little harder to reduce and bleach than aspen.

Possible Uses—Same as aspen.

BLACK GUM—Nyssa sylvatica. Wt. 30lb. Fiber 1.7 m.m.

Range—From Maine (Kennebec River) to Florida (Kissimmee River and Tampa Bay) and west to southern

Ontario, southern Michigan (up to Gratiot County), southeastern Missouri, and Texas (Brazos River)

Common Names—Black Gum (N. J., Pa., Del., Va., W. Va., N. C., S. C., Ga., Ala., Fla., Miss., La., Tex., Ill., Ind.); Sour Gum (Vt., Mass., R. I., N. Y., N. J., Pa., Del., Va., W. V., S. C., Fla., Tex., Ohio, Ind., Ill.); Tupelo (Mass., R. I., N. J., Del., S. C., Ala., Fla., Miss., Tex., Ill., Ohio); Pepperidge (Vt., Mass., R. I., N. Y., N. J., S. C., Tenn., Mich., Ohio, Ont.); Wild Peartree (Tenn.); Yellow Gumtree (Tenn.); Gum (Md.); Stinkwood (W. Va.); Tupelo Gum (Fla.).

Soda Pulp

Yield 1,300lb.

Character—Soft; a little harder to cook and bleach than aspen.

Possible Uses—Similar to aspen.

Mechanical Pulp

Yield 2,610lb.

Character—Very short, but tough fiber, very white color.

Possible Uses—As a filler with longer fibered stock.

Cotton Gum—Nyssa aquatica. Wt. 29lb. Fiber 1.6 m.m.

Range—Coast region from southern Virginia to northern Florida, and through the Gulf States to Texas (Nueces River); northward through Arkansas, west Tennessee and Kentucky, southern and southeastern Missouri to southern Illinois (lower Wabash River).

Common Names—Large Tupelo (Ala., La., Tex.); Tupelo Gum (Ga., Ala., Miss., La.); Sour Gum (Ark., Mo.); Swamp Tupelo (S. C., La.); Cotton Gum (N. C., S. C., Fla.); Tupelo (N. C., S. C.); Wild Olivetree (La.); Olivier à grandes feuilles (La.); Olivertree (Miss.); Bay Poplar (Ala.).

Sulphite Pulp

Yield 1,160lb. Easily bleached.

Easily pulped. Poor strength—fair color.

Possible Uses—Same as aspen.

Soda Pulp

Yield 1,200lb.

Character—Soft, but harder to bleach than aspen.

Possible Uses—Similar to aspen.

Red Gum—Liquidambar styraciflua. Wt. 27lb. Fiber 1.6 m.m.

Range—From Connecticut (Fairfield County) to southeastern Missouri and Arkansas; south to Florida (Cape Canaveral and Tampa Bay) and Texas (Trinity River).

Common Names—Sweet Gum (Mass., R. I., N. Y., N. J., Pa., Del., Va., W. Va., N. C., S. C., Ga., Ala., Fla., Miss., La., Tex., Ark., Ky., Mo., Ill., Ind., Ohio); Liquidamber (R I., N. Y., Del., N. J., Pa., La., Tex., Ohio, Ill.); Red Gum (Va., Ala., Miss., Tex., La.); Gum (Va.); Gumtree (S. C., La.); Alligator-wood (N. J.); Bilsted (N. J.); Starleaved Gum; Satin Walnut (lumber markets).

Sulphite Pulp

Yield 1,190lb. Difficult to bleach.

Easily pulped. Very poor strength. Dark colored.

Possible Uses—Few.

Soda Pulp

Yield 1,080lb.

Character—A little more difficult to reduce than aspen. Soft and hard to bleach.

Possible Uses—Same as aspen.

Red Oak—Quercus rubra. Wt. 35lb. Fiber 1.5 m.m.

Range—Nova Scotia and southern New Brunswick through Quebec and along the north shores of Lake Huron to near Lake Namekagon; south to middle Tennessee and Virginia, and along the Appalachian Mountains to northern Georgia; west to eastern Nebraska, central Kansas.

Common Names—Red Oak (Me., Vt., N. H., Mass., R. I., N. Y., N. J., Pa., Del., Va., W. Va., N. C., S. C., Ga., Ark., Mo., Ky., Ill., Ind., Iowa, Nebr., Kansas, Mich., Minn., S. Dak., Ont.); Black Oak (Vt., Conn., N. Y., Wis., Iowa, Nebr., S. Dak., Ont.); Spanish Oak (Pa., N. C.).

Sulphite Pulp

Yield 1,600lb. Easily bleached.

Easily pulped. Very weak—poor color.

Possible Uses—Few.

Soda Pulp

Yield 1,400lb.

Character—Very difficult to pulp and bleach.

Possible Uses—Few.

White Oak—Quercus alba. Wt. 37lb. Fiber 1.5 m.m.

Range—From southern Maine to southwestern Quebec and through central and southern Ontario, lower peninsula of Michigan and southern Minnesota to southeastern Nebraska and eastern Kansas; south to northern Florida and Texas (Brazos river.)

Common Names—White Oak (Me., N. H., Vt., Mass., R. I., Conn., N. Y., N. J., Pa., Del., Va., W. Va., N. C., S. C., Ala., Fla., Ga., Miss., La., Tex., Ky., Mo., Ohio, Ill., Ind., Kansas, Nebr., Mich., Wis., Minn., S. Dak., (cult.), Iowa, Ont.); Stave Oak (Ark.).

Soda Pulp

Yield 1,480lb.

Character—Difficult to pulp and bleach.

Possible Uses—Few.

Sycamore—Platanus occidentalis. Wt. 29lb. Fiber 1.7 m.m.

Range—Southeastern New Hampshire and southern Maine to northern Vermont and Lake Ontario (Don River, near north shores of the lake); west to eastern Nebraska and Kansas, and south to northern Florida, central Alabama and Mississippi, and Texas (Brazos river and thence south to Devils river).

Common Names—Sycamore (Vt., N. H., Mass., Conn.,

R. I., N. Y., N. J., Pa., Del., Va., W. Va., N. C., S. C., Ga, Fla., Ala., Miss., La., Tex., Ky., Ark., Mo., Ill., Ind., Iowa, Kansas, Nebr., Mich., Wis., Ohio, Ont.); Buttonwood (Vt., N. H., R. I., Mass., N. Y., N. J., Pa., Del., S. C., Ala., Miss., La., Tex., Ark., Mo., Ill., Nebr., Mich., Minn., Ohio, Ont.); Buttonball-tree (Mass., R. I., Conn., N. Y., N. J., Pa., Del., Miss., La., Mo., Ill., Iowa, Mich., Nebr., Ohio); Buttonball (R. I., N. Y., Pa., Fla.); Planetree (R. I., Del., S. C., Kans., Nebr., Iowa); Water Beech (Del.); Platane (La.); Cotonier (La.); Bois puant (La.) Oo-da-te-cha-wun-nes="Big stockings" (Indians, N. Y.)

Soda Pulp

Yield 1,300lb.

Character—Soft, easily bleached.

Possible Uses—Similar to aspen.

Black Willow—Salix nigra. Wt. 21lb. Fiber 0.8 m.m.

Range—New Brunswick to southern Florida and west to eastern Dakota, Nebraska, Kansas, Oklahoma, southern Arizona, and south into Mexico. In California from the Sierra Nevada to Colusa County, and Sacramento River to Arizona.)

Common Names—Black Willow (N. H., Vt., R. I., N. Y., Pa., Del., S. C., Fla., Ala., Miss., La., Tex., Ariz., Cal., N. Mex., Utah, Ill., Wis., Mich., Minn., Nebr., Kan., Ohio, Ont., N. Dak.); Swamp Willow (N. C., S. C.); Willow (N. Y., Pa., N. C., S. C., Miss., Tex., Cal., Ky., Mo., Nebr.).

Sulphite Pulp[1]

Yield 1,150lb. Easily bleached.

Easily pulped. Very weak—excellent color.

Possible Uses—Same as aspen.

Soda Pulp

Yield 950lb.

Character—Soft and easily bleached.

Possible Uses—Similar to aspen.

Beech—Fagus atropunicea. Wt. 36lb. Fiber — — — —

Range—Nova Scotia to Lake Huron (north shores) and northern Wisconsin; south to western Florida and west to southeastern Missouri and Texas (Trinity River).

Common Names—Beech (Me., N. H., Vt., Mass., R. I., Conn., N. Y., N. J., Pa., Del., Va., W. Va., N. C., S. C., Ga., Ala., Fla., Miss., La., Tex., Ark., Ky., Mo., Ohio, Ill., Ind., Mich., Nebr., Minn., Ont.); Red Beech (Me., Vt., Ky., Ohio); White Beech (Me., Ohio, Mich.); Ridge Beech (Ark.).

Soda Pulp

Yield 1,530lb.

Character—Slightly more difficult to reduce than aspen—soft, easily bleached.

Possible Uses—Same as aspen.

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[1]Because of lack of wood, an insufficient number of cooks on this material were made. The yield appear abnormally high

wood for pulp & paper
various species of

8—2432